

QUEST

ADVENTURES IN THE WORLD OF SCIENCE

FLIGHT

FACT FILES ON:

- Aerodynamics
- Birds and bats
- Sky wars
- Futuristic aircraft
- Flight simulators
- Helicopters
- Computer flights
- Gliders and floaters

PLUS

THREE PROJECTS

GOLDEN EAGLE POSTER

7

MODEL:

**BLACKBIRD
SPY PLANE**



INSIDE THIS PACK

FACT FILES

- Aerodynamics ► Birds
- Helicopters ► Sky wars
- Aircraft 2000 ► Flight simulators ► Computer command



MODEL Blackbird spy plane



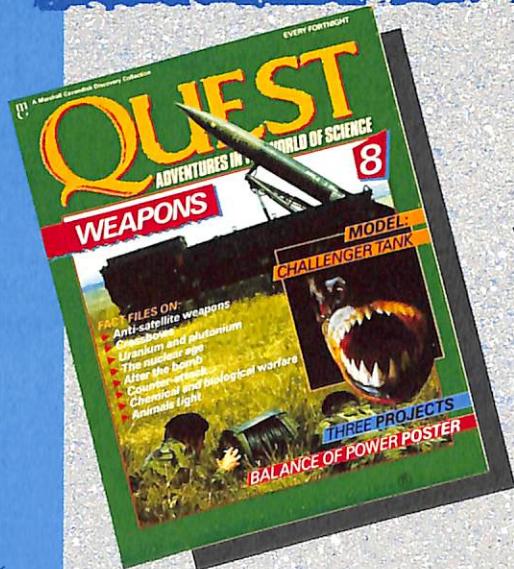
POSTER King of the skies

PROJECT SHEET

- Create upward lift
- Launch a hot-air balloon



COMING IN QUEST 8 WEAPONS

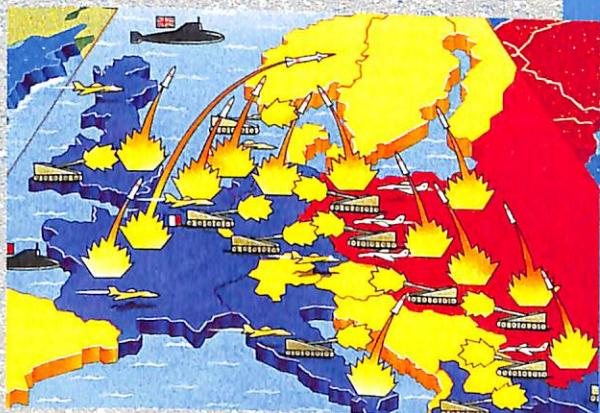


MODEL
Challenger Tank



FACT FILES INCLUDE

- Hunting bows ► Animal armoury ► Killer satellites
- Chemical and biological warfare ► Uranium
- Counter-attack
- Nukes + Nuclear aftermath

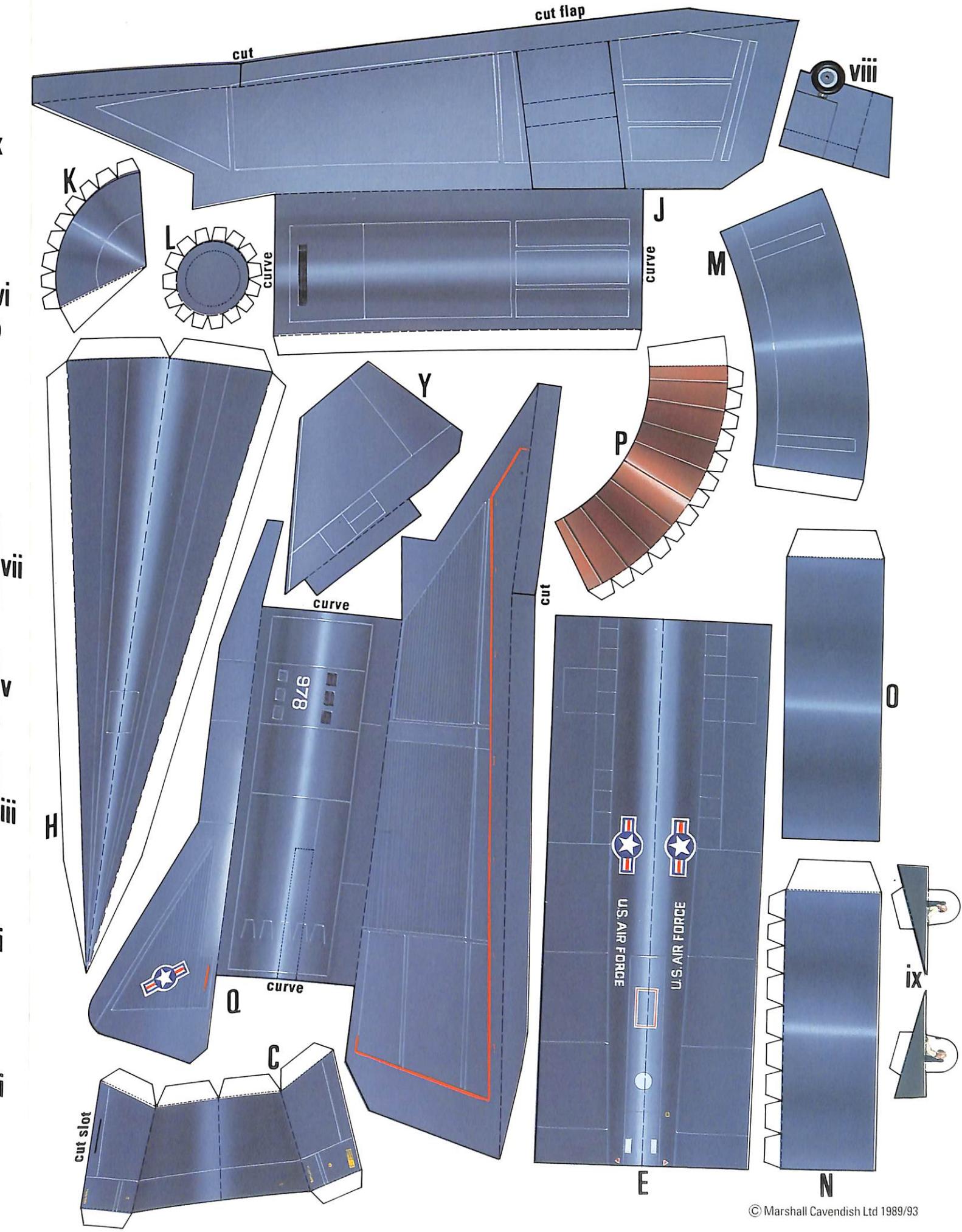
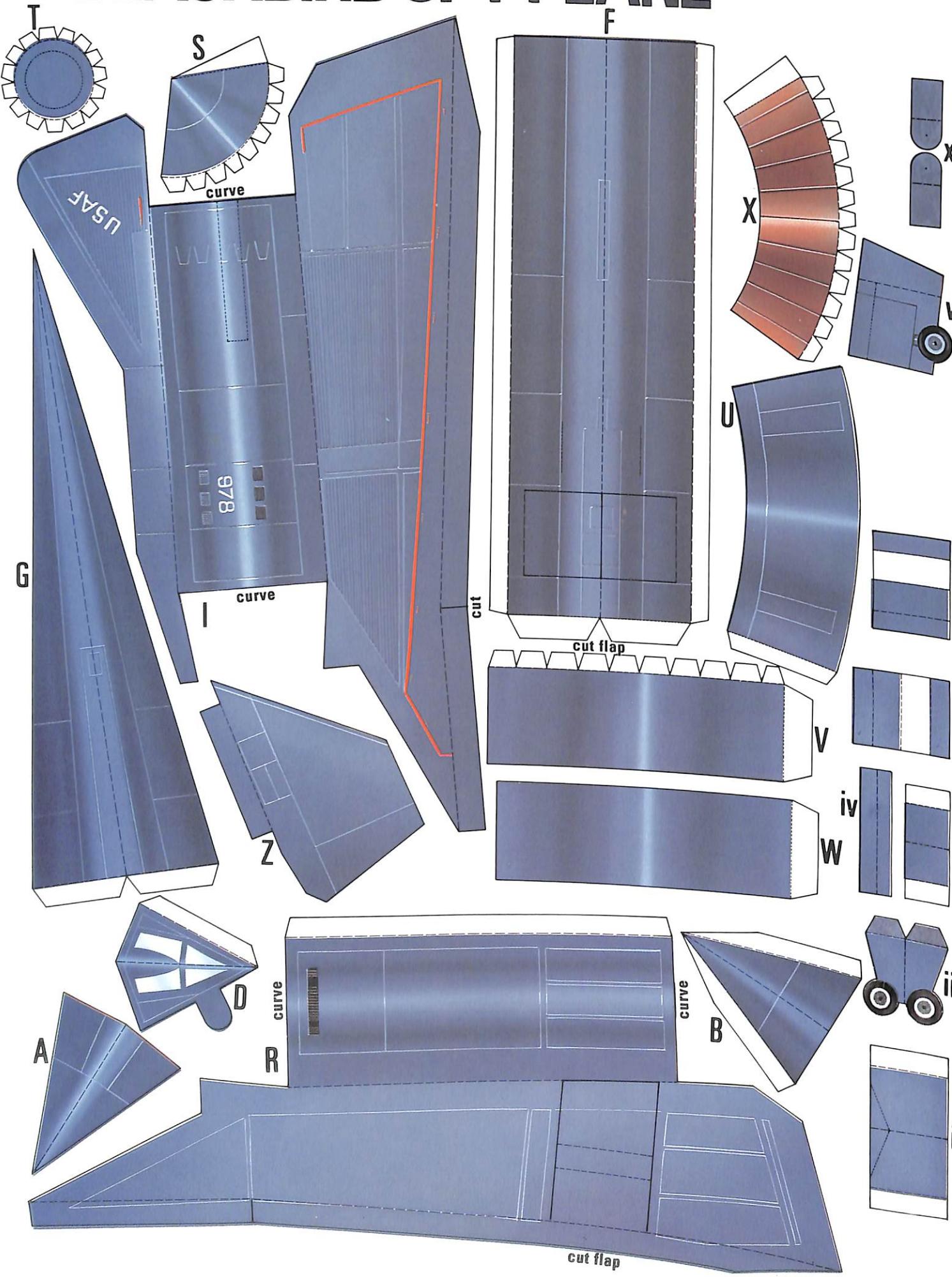


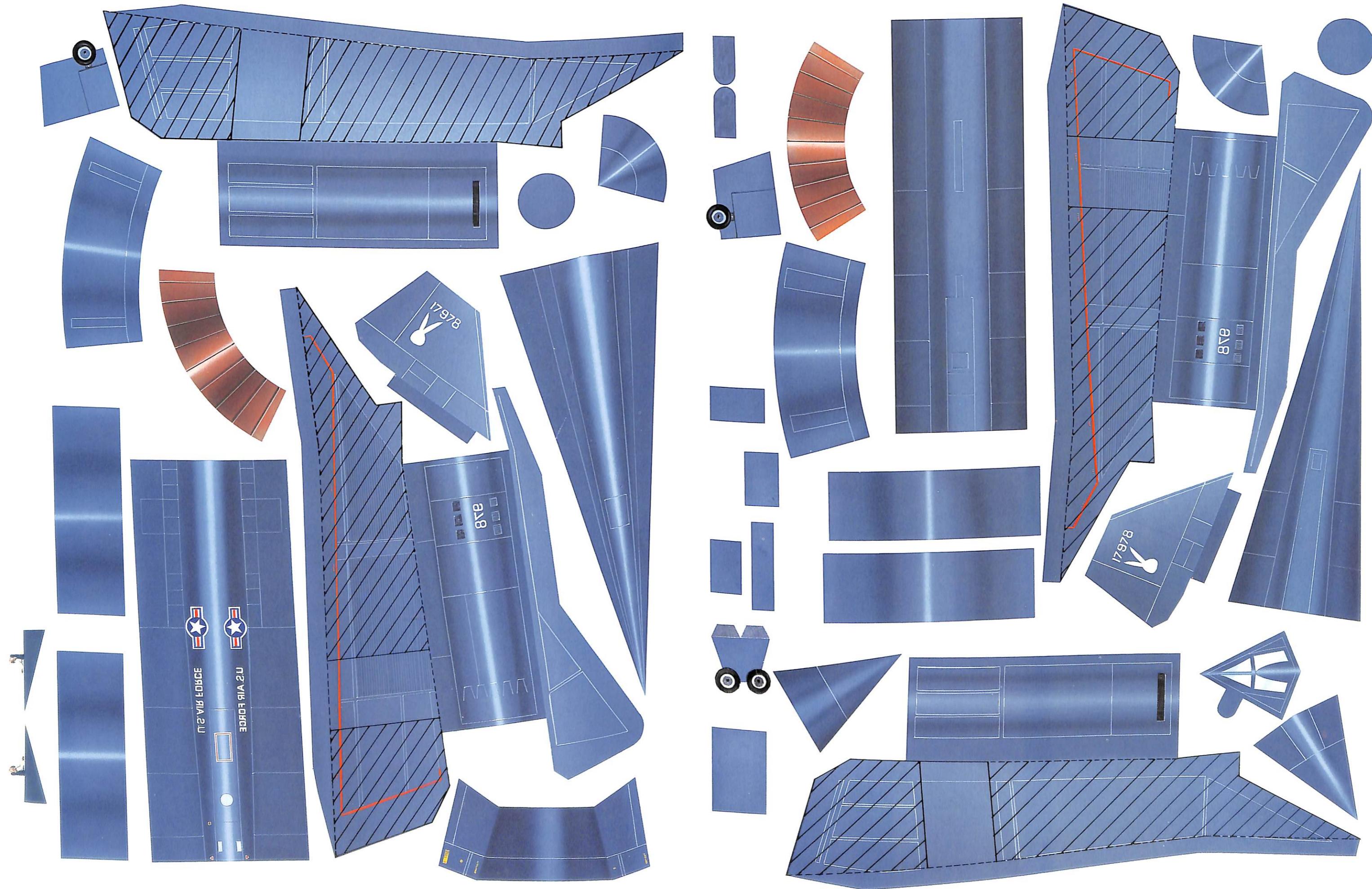
POSTER Balance of power

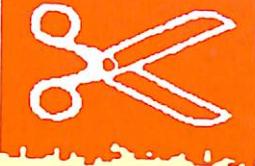
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BLACKBIRD SPY PLANE







MODEL ASSEMBLY INSTRUCTIONS

You will need

- Scissors • Ruler •
- Craft knife • Glue •
- Nylon thread (optional)

Before cutting out the pieces, score along all broken lines with a blunt edge and ruler. Study ASSEMBLY DIAGRAM to see how the pieces fit together, and use dotted lines as a guide for positioning.

To make up Nose and cockpit

- 1 Cut out upper nose **A** and lower nose **B**. Fold to shape, and glue tabs of **B** to underside edges of **A**.
- 2 Cut out lower cockpit **C**. Cut slot with a craft knife and fold to shape. Glue four tabs to inside edges of **A** and **B** (see ASSEMBLY DIAGRAM).
- 3 Cut out upper cockpit **D**. Fold to shape and glue tab to underside edge of lower cockpit **C**. Push tongue on **D** into slot.

Fuselage

- 1 Cut out upper fuselage **E** and fold.
- 2 Cut out lower fuselage **F**. Cut flaps within fuselage along solid lines with a craft knife and fold down. Fold to shape.
- 3 Cut out lower fuselage **G** and upper fuselage **H**. Fold to shape and glue tabs of **H** to underside edges of **G**.
- 4 Glue tabs of fuselage **G** to inside edge of fuselage **F**.
- 5 Glue tabs of fuselage **F** to inside edges of lower cockpit **C**.
- 6 To finish the body, apply glue to tabs of fuselage **H** and **F**, and cockpit **C** and stick on upper fuselage **E**.

Wings

- 1 Cut out upper wing **I** and fold tabs up. Curl the curved section of wing to shape by scraping the edge of a ruler under it.
- 2 Cut out lower wing **J** and fold tabs up. Cut flaps along solid lines and fold back to shape. Curl the curved section over the edge of a ruler.
- 3 Apply glue to shaded area of underside flat edges of **I** and **J** and press together. Glue tab of **J** to underside edge of **I**.

Engine and exhaust

- 1 Cut out engine intake **K** and **L**. Curve and glue **K** to shape. Fold tabs under and glue on to engine intake **L**. Fold tabs of **L** down.
- 2 Cut out engine cowl **M** and **N**. Curve and glue to shape.
- 3 To join engine intake and cowl, keep all joins aligned at the bottom and glue tabs of **L** to inside edge of **M**, and tabs of **N** to inside edge of **M** (see ASSEMBLY DIAGRAM). Push the completed engine into position on front of wing **I/J**.
- 4 Cut out engine exhaust **O** and **P**. Curve and glue to shape. Glue tabs

of **P** to inside edge of **O** and push into position at the back of wing **I/J**.

- 5 Repeat this entire process with upper wing **Q** and lower wing **R**: engine intake **S**, **T**; engine cowl **U**, **V**; engine exhaust **W**, **X**.

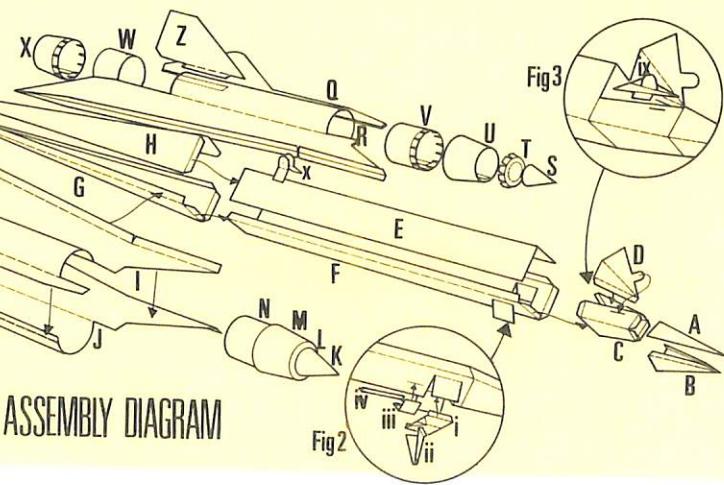
- 6 To attach the completed wings, press tabs of wings open and glue each one on to either side of fuselage (see ASSEMBLY DIAGRAM).

To finish

- 1 Cut out tail plane **Y** and **Z**. Fold tabs up and glue **Y** on to upper wing **I**, and **Z** on to upper wing **Q**.
- 2 Cut out front undercarriage **i**, **ii**. Fold tabs of **ii** up, fold to shape and glue tabs in position on **i**. Fold tabs of **i** down and glue to inside edges of flaps on lower fuselage **F** (see Fig. 2).
- 3 Cut out flap lock **iii**, **iv**. Fold tabs of **iii** under and glue on to lower fuselage **F**. Fold **iv**, position over fold of lower fuselage **F** and slide under **iii** to hold flaps closed. Slide out to open flaps and release undercarriage.
- 4 Cut out back undercarriage **v** and **v** fold to shape. Glue white tabs of **v** to underside of wing **J** and coloured tab on to flap (see Fig. 1).
- 5 Cut out back undercarriage **vi**. Fold to shape and glue on to side of **v** (see Fig. 1).
- 6 Repeat this procedure with back undercarriage **vii** and **viii**.
- 7 Cut out two pilot pieces **ix**. Fold to shape and glue top section back to back. Fold tabs down and glue to inside edges of cockpit **D** (see Fig. 3).

To suspend the model

If you would like to suspend the Blackbird model, cut out the two suspension tags **x**. Pierce to make a hole where indicated and glue to either side of fuselage **E** (see ASSEMBLY DIAGRAM). Thread a length of nylon thread through the holes and suspend the model.



ASSEMBLY DIAGRAM



PROJECTS

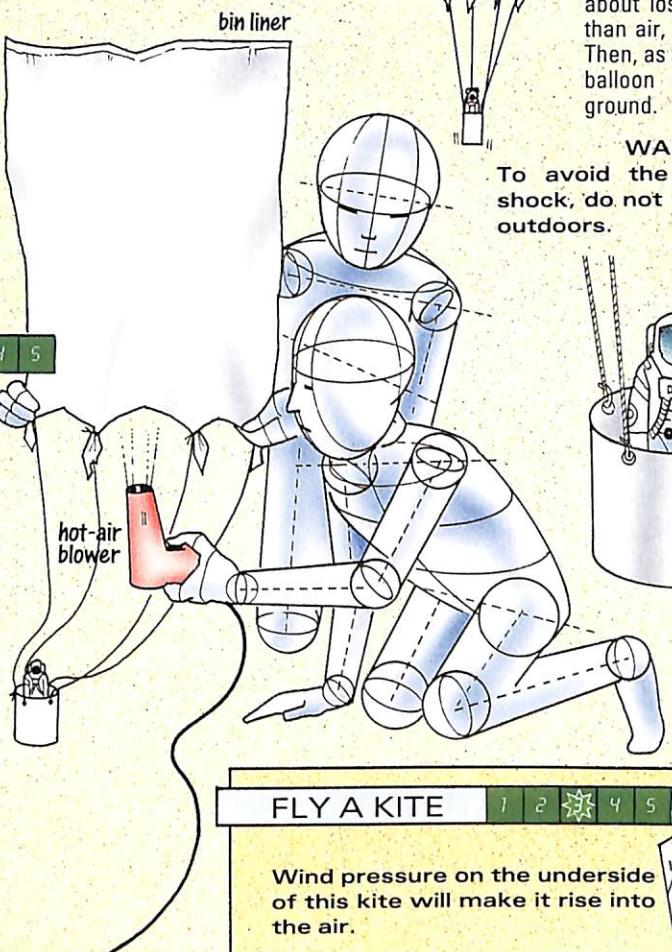
FLIGHT

- How can you make and launch a hot-air balloon?
- How can you create an upward force by blowing down?
- What makes a kite stay up in the air?

HOT-AIR BALLOON

A large plastic bag, filled by means of a hot-air blower, will carry a small load high into the air.

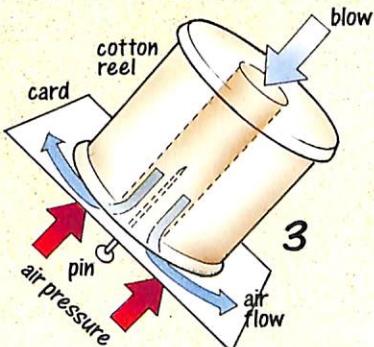
The plastic bag should have a large volume, but low weight. Check that there are no holes in it. Most kitchen bin liners work well as they are made of very thin plastic, which keeps the weight down. Some other waste disposal bags have a much larger volume, but may be too thick and heavy. Use part of an empty pepper or spice carton for the balloon's gondola ('basket'). Make holes around the top edge of the carton, and tie it to the bag with four thin strings, as shown. Put a toy 'passenger' in the gondola, and add a pebble, if necessary, to pull the strings taut. Then get a friend to hold the bag open while you fill it with hot air. Use a hairdryer on hottest setting, and hold the blower



THE MAGIC CARD

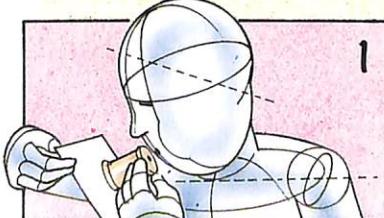
This amazingly simple trick demonstrates the Bernoulli effect, which keeps aeroplanes in the air.

Take a small piece of thin cardboard and push a pin through the middle. Hold the card against one end of a cotton reel, with the pin passing into the hole. Then

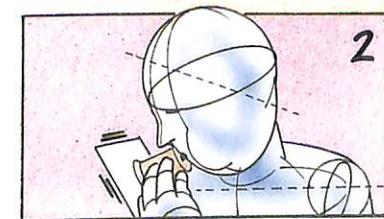


1

blow through the cotton reel from the other end (1). Now let go of the card. It will stay close to the cotton reel, no matter how hard you blow (2). The reason is that the air you blow passes over the surface of the card (3). The faster this air moves, the lower its pressure becomes. So the normal air pressure on the other side is greater, and keeps the card in place. The pin prevents the card from slipping sideways.



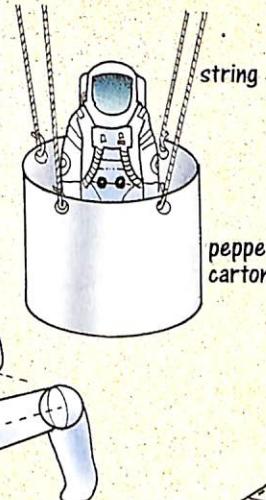
2



just below the bag – not too close, or the plastic may shrivel. Release the balloon outside, with a strong thread attached if you are worried about losing it. Being lighter than air, the balloon will rise. Then, as the air in it cools, the balloon will return to the ground.

WARNING

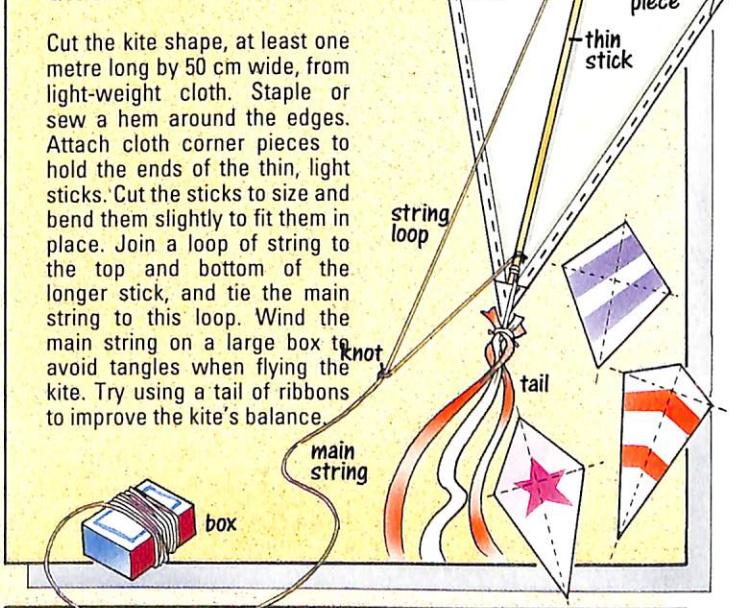
To avoid the risk of electric shock, do not use the hairdryer outdoors.



FLY A KITE

Wind pressure on the underside of this kite will make it rise into the air.

Cut the kite shape, at least one metre long by 50 cm wide, from light-weight cloth. Staple or sew a hem around the edges. Attach cloth corner pieces to hold the ends of the thin, light sticks. Cut the sticks to size and bend them slightly to fit them in place. Join a loop of string to the top and bottom of the longer stick, and tie the main string to this loop. Wind the main string on a large box to avoid tangles when flying the kite. Try using a tail of ribbons to improve the kite's balance.



PROJECT INFORMATION



Each QUEST project has its own difficulty rating: 1 very simple, 2 simple, 3 intermediate, 4 advanced, 5 complicated.

WARNING!

Parents should supervise experiments involving sharp tools, water and electricity. The publisher can accept no responsibility for injury.



KING OF

PROFILE

THE GOLDEN EAGLE

Aquila chrysaetos

Habitat: High, rocky places in stark mountainous regions of North America, Europe, North Africa and parts of Asia. A pair of Golden Eagles will command a territory of more than 1,200 hectares.

Size: Up to 90 cm in length, with a wingspan of 188-196 cm. The female is slightly larger than the male.

Plumage: Golden neck feathers. Juveniles have blackish-brown plumage with distinctive white patches on upper and

lower sides of wings. As the juvenile grows, its wings and tail become shorter.

Eggs: Two are laid at a time, each 70-90 mm x 50-56 mm. They are incubated by the female for 45 days, the male sometimes relieving her to let her stretch her wings.

First flight: Between 70 and 80 days old.

Diet: The Golden Eagle is a bird of prey and its diet consists of other birds, amphibians, reptiles, insects, hares, marmots, lambs or kids, and even foxes, which its powerful talons can clutch and carry over long distances.

Mark Iley



QUEST



On the wing
The Golden Eagle raises its wings as it soars. No other eagle soars like this. But as it glides, its wings are flattened. The broad outstretched wings - the end primary feathers splayed out and turned up - provide enough lift to carry it for hours.

Swift predator
When it spots a prey, the Golden Eagle makes a sudden and spectacular dive to scoop the hapless creature in its lethal talons.

A predator turned victim, the Golden Eagle is now sadly classified as an endangered species in Britain and is also threatened worldwide thanks to human intervention. Gamekeepers and shepherds kill it as an enemy of their flock, and new forests planted within their hunting territories have forced the Golden Eagle out.

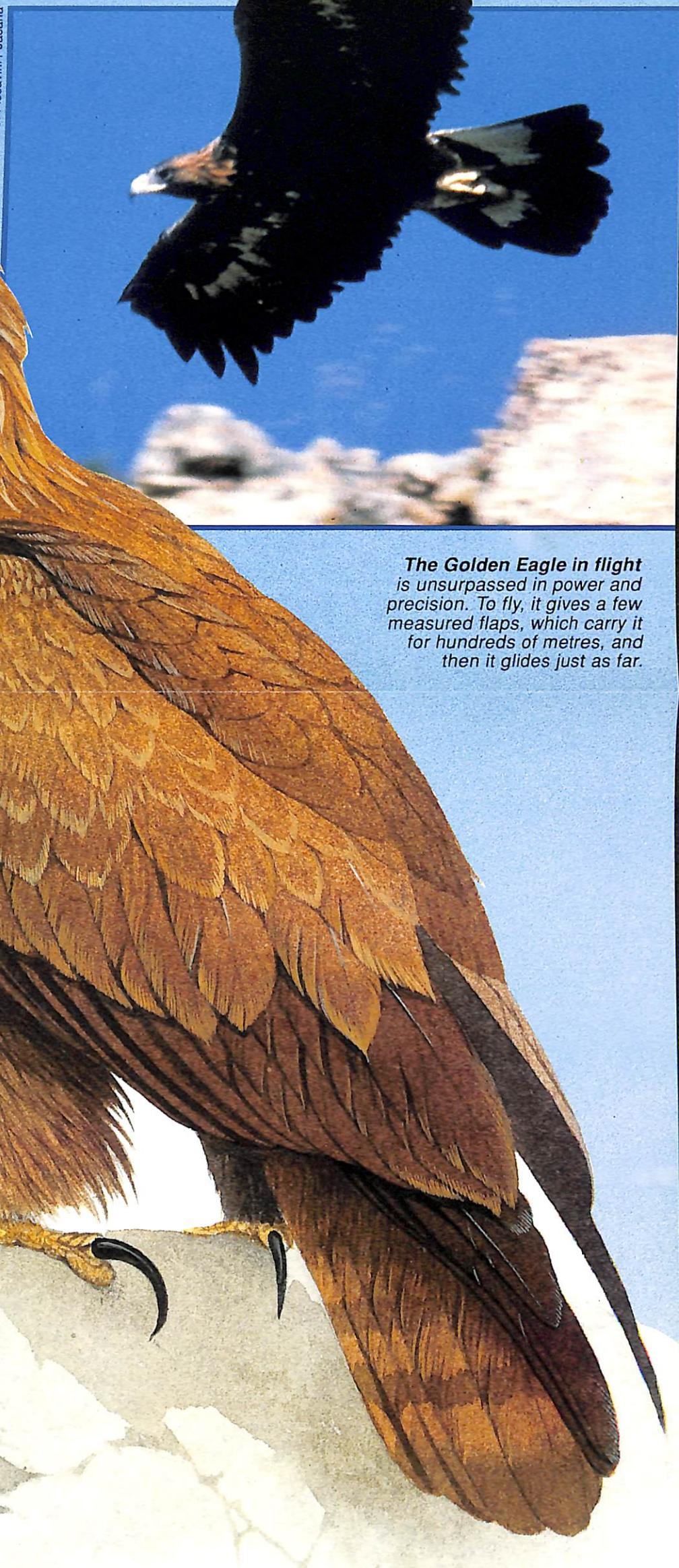
Leonard Lee Rue III / Bruce Coleman Limited

AERIAL

THE SKIES



C. Pissavini / Jacana



The Golden Eagle in flight is unsurpassed in power and precision. To fly, it gives a few measured flaps, which carry it for hundreds of metres, and then it glides just as far.

ACROBAT